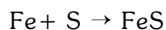


## LIMITING REAGENTS

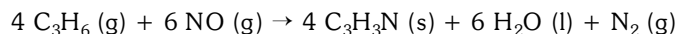
- When 7.24 moles of magnesium and 3.86 moles of oxygen react to form magnesium oxide,
  - which reactant will be left over?
  - how much of the excess reactant will remain?
  - how much product will be made?

Give answers in moles  
for this question.
- When 1.00 g zinc metal is placed in a solution made with 5 g lead (II) nitrate, a single displacement reaction.
  - Which reactant is in excess?
  - How many grams of lead will be formed?
- If 7.56 g of iron metal are placed with 0.1 moles of hydrochloric acid solution, hydrogen gas and iron (II) chloride are produced.
  - Which reactant is limiting, and how much excess of the other reactant is there?
  - Calculate the mass of each product.
- At high temperatures, sulfur combines with iron to form the brown-black iron (II) sulfide:



In one experiment, 7.62 g of Fe are allowed to react with 8.67 g of S.

- What is the limiting reagent, and what is the reactant in excess?
  - Calculate the mass of FeS formed.
- Acrylonitrile,  $\text{C}_3\text{H}_3\text{N}$ , is the starting material for the production of a kind of synthetic fiber known as acrylics) and can be made from propylene,  $\text{C}_3\text{H}_6$ , by reaction with nitrogen monoxide,  $\text{NO}$ , as follows:



What mass of acrylonitrile can be made when 21.6 g of propylene react with 21.6 g of nitrogen monoxide?

- Calculate the percent yield for the reaction:  $\text{P}_4 (\text{s}) + 6 \text{Cl}_2 (\text{g}) \rightarrow 4 \text{PCl}_3 (\text{l})$  if 75.0 g of phosphorus reacts with excess chlorine gas to produce 111.0 g of phosphorus trichloride.
- When iron(II) hydroxide is mixed with phosphoric acid,  $\text{H}_3\text{PO}_4$ , iron(II) phosphate precipitate results. If 3.20 g of iron(II) hydroxide is combined with 2.50 g of phosphoric acid, what mass of the precipitate should be created? What is the percentage yield if 3.99 g of the precipitate is actually obtained?
- Nitrogen gas can be prepared by passing gaseous ammonia over solid copper (I) oxide at high temperature. The other products of the reaction are solid copper metal and water vapor. How many grams of nitrogen are formed when 18.1 g of ammonia is reacted with 90.4 g of copper (I) oxide, assuming a complete reaction?
- Lithium nitride is prepared by the reaction of lithium metal and nitrogen gas via a synthesis reaction. What is the percent yield of lithium nitride if 76.8 g of lithium nitride is recovered from reacting 56.0 g of nitrogen gas with 56.0 g of lithium metal?
- Each of the above questions are very similar to the stoichiometry questions that we have attempted prior to today. What clue, in each of the above questions, tells you that the question is of the *limiting reagent* variety?